IN THE CLAIMS

Please amend the claims as follows.

1. (Currently Amended) An optical component comprising:

a glass substrate doped with a laser species;

a substrate waveguide defined within the glass substrate, the substrate waveguide having an output facet; and

a diode pump laser having a diode laser and a waveguide cavity abutted to an output facet of the diode laser to provide an extended waveguide cavity such that a laser resonator cavity of the diode pump laser includes the extended waveguide cavity, the extended waveguide cavity being positioned adjacent, above and along ~~to~~ a length of the substrate waveguide ~~and positioned along length of the substrate waveguide~~, the extended waveguide cavity coupled to the substrate waveguide so that pump light from along a length of the extended waveguide cavity of the diode laser's resonator cavity is transferred into the substrate waveguide along at least a portion of the length of the substrate waveguide to provide light from the output facet of the substrate waveguide.

2. (Previously Presented) The optical component of claim 1 wherein the substrate is doped with Yb and Er.

3. (Previously Presented) The optical component of claim 1 wherein the substrate is doped with Er.

4. (Previously Presented) The optical component of claim 1 wherein the substrate waveguide forms a laser resonator cavity within the substrate.

5. (Previously Presented) The optical component of claim 4 further comprising a reflection grating formed on the substrate surface along the substrate waveguide that provides feedback to the substrate waveguide's laser resonator cavity.

6. (Previously Presented) The optical component of claim 5 further comprising:

a cladding deposited on the reflection grating of the substrate waveguide, the cladding being composed of an electro-optic polymer with a variable index of refraction; and

electrodes for applying an electrical potential across the grating cladding to vary the index of refraction in accordance therewith and thereby vary the wavelength of light reflected by the grating.

7. (Previously Presented) The optical component of claim 5 further comprising electrodes and a resistive element for heating and thermally expanding the reflection grating of the substrate waveguide to alter the wavelength reflected by the grating.

8. (Previously Presented) The optical component of claim 5 further comprising electrodes for applying an electrical potential to a piezo-electric coating applied to the reflection grating to thereby vary the wavelength of light reflected by the grating.

9. (Previously Presented) The optical component of claim 5 wherein the reflection grating is composed of an electro-optic polymer and further comprising electrodes for applying an electrical potential across the grating to vary the index of refraction in accordance therewith and thereby vary the wavelength of light reflected by the grating.

10. (Previously Presented) The optical component of claim 5 further comprising:

one or more additional reflection gratings formed on the substrate waveguide, each grating having a cladding composed of an electro-optic polymer with a variable index of refraction deposited thereon; and

electrodes for selectively applying an electrical potential across each grating cladding to vary the index of refraction in accordance therewith and render the grating transparent or reflective at a wavelength corresponding to a longitudinal mode of the substrate waveguide laser cavity.

11. (Previously Presented) The optical component of claim 4 further comprising a mirror coupled to a location along the substrate waveguide for providing feedback to the substrate waveguide's laser resonator cavity.

12. (Previously Presented) The optical component of claim 1 wherein the extended waveguide cavity of the pump diode laser is a dielectric waveguide abutted at one end to an antireflection-coated gain section of the diode laser and at another end to a highly reflective mirror.

13. (Previously Presented) The optical component of claim 1 wherein the extended waveguide cavity of the pump diode laser is a dielectric waveguide abutted at one end to an antireflection coated gain section of the diode laser and at another end to a reflection grating.

14. (Previously Presented) The optical component of claim 1 wherein the extended waveguide cavity of the pump diode laser has a lower index of refraction than the substrate waveguide and forms part of a cladding thereof.

15. (Previously Presented) The optical component of claim 1 wherein the extended waveguide cavity is abutted to the surface of the substrate waveguide and separated therefrom by a layer of cladding with apertures for transmitting pump light into the substrate waveguide.

16. (Previously Presented) The optical component of claim 1 wherein the separation between the extended waveguide cavity and the substrate waveguide is such that pump light is transmitted by evanescent coupling.

17. (Currently Amended) A method for operating a waveguide optical component comprising:

providing a diode pump laser having a diode laser and a waveguide abutted to an output facet of the diode laser to provide an extended waveguide such that a laser resonator cavity of the diode pump laser includes the extended waveguide;

transmitting pump light from along a length of the extended waveguide of the diode pump laser resonator cavity into a substrate waveguide of the optical component along a length of the substrate waveguide, the extended waveguide cavity being positioned above and adjacent to the length of the substrate waveguide and positioned along the length of the substrate waveguide and coupled to the substrate waveguide.

18. (Previously Presented) The method of claim 17 wherein the substrate waveguide is composed of glass doped with Er and Yb and forms a laser cavity, with the diode laser and extended waveguide thereof being tuned to provide pump light at a wavelength appropriate to cause lasing in the substrate waveguide cavity.

19. (Previously Presented) The method of claim 17 wherein pump light from the extended waveguide of the diode pump laser is transmitted into the substrate waveguide via evanescent coupling.

20. (Previously Presented) The method of claim 17 wherein pump light from the extended waveguide of the diode pump laser is transmitted into the substrate waveguide through apertures in a layer of cladding material interposed therebetween.

21. (Previously Presented) The method of claim 17 wherein the substrate waveguide forms a laser cavity having a reflection grating at one end for providing optical feedback to the cavity and further wherein an electro-optic polymer having a variable index of refraction is deposited on the grating to form a cladding thereon, the method further comprising tuning the laser cavity by applying an electrical potential to the grating cladding to select a wavelength reflected by the grating that corresponds to a longitudinal mode of the substrate waveguide cavity.

22. (Previously Presented) The method of claim 17 wherein the substrate waveguide forms a laser cavity having a plurality of spaced apart reflection gratings at one end for providing optical feedback to the cavity and further wherein an electro-optic polymer having a variable index of refraction is formed on each one of the gratings to constitute claddings thereon, the method

further comprising tuning the laser cavity by selectively applying an electrical potential to the grating claddings to render one grating reflective at a wavelength that corresponds to a longitudinal mode of the substrate waveguide cavity.

23. (Previously Presented) The optical component of claim 1, further comprising:

one or more additional waveguides defined within the substrate;

a diffraction Bragg reflector feedback element associated with each one of the plurality of waveguides for providing optical feedback to the respective waveguides to form respective laser-resonator cavities, wherein injection of pump light from the pump laser at one or more suitable wavelengths into each laser-resonator cavity causes output of laser light at a wavelength in accordance with a longitudinal cavity mode of the respective cavity,

wherein the respective laser-resonator cavities each have a different width selected from a plurality of widths on the substrate surface adjacent its associated diffraction Bragg reflector (DBR) to thereby define a plurality of different wavelengths.

24. (Previously Presented) The optical component of claim 23 wherein the laser-resonator cavities are fabricated in a plurality of groups, wherein the cavities in each group have a plurality of widths on the substrate surface adjacent a DBR to thereby define a plurality of different wavelengths defined at spaced-apart wavelength intervals, such that one cavity per group matches a standard wavelength associated with that group.

25. (Previously Presented) The optical component of claim 23 wherein each feedback element comprises a reflection grating formed on the substrate surface along the length of the waveguide and wherein a reflection grating of a single pitch is formed on the surface of the substrate at differing angles to a plurality of waveguides to form laser-resonator cavities of differing lasing wavelengths.

26. (Previously Presented) The optical component of claim 1, wherein the glass substrate comprises a block of glass having distinct regions doped with varying concentrations of one or more laser species, wherein the substrate is constructed by fusing together a plurality glass

blocks having differing concentrations of the same dopants wherein at least one region is undoped, wherein at least a portion of the waveguide is located in an undoped region of the substrate.

27. (Previously Presented) The optical component of claim 1, wherein the glass substrate comprises a block of glass having distinct regions doped with varying concentrations of one or more laser species, wherein the substrate is constructed by fusing together a plurality glass blocks having differing concentrations of different dopants wherein at least one region is undoped, wherein at least a portion of the first waveguide is formed in an undoped region of the substrate.

28. (Previously Presented) The optical component of claim 1, wherein the glass substrate comprises a block of glass having distinct regions doped with varying concentrations of one or more laser species, wherein the substrate is constructed by fusing together a plurality glass blocks having differing concentrations of the same or different dopants, further comprising a laser amplifier fabricated therein, wherein the resonator and amplifier are formed in regions of the substrate with different dopant concentrations.

29. (Previously Presented) The optical component of claim 1, wherein the glass substrate comprises a block of glass having distinct regions doped with varying concentrations of one or more laser species, wherein the substrate is constructed by fusing together a plurality glass blocks having differing concentrations of the same or different dopants, the substrate further comprising a plurality of laser resonators fabricated therein, wherein the resonators are formed in regions of the substrate doped with different laser species so that lasing occurs within the resonators at different wavelengths.

30. (Previously Presented) The optical component of claim 1, further comprising:

a reflection grating along the substrate waveguide for providing feedback to the resonator cavity;

means for tuning the laser by altering the wavelength reflected by the grating, wherein the laser tuning means comprises:

a cladding deposited on the reflection grating of the substrate waveguide, the cladding being composed of an electro-optic polymer with a variable index of refraction; and

electrodes for applying an electrical potential across the grating cladding to vary the index of refraction in accordance therewith and thereby vary the wavelength of light reflected by the grating.

31. (Previously Presented) The optical component of claim 1, further comprising:

a reflection grating adjacent the substrate waveguide for providing feedback to the resonator cavity;

means for tuning the laser by altering the wavelength reflected by the grating, wherein the laser tuning means comprises:

one or more additional reflection gratings formed on the substrate waveguide, each grating having a cladding composed of an electro-optic polymer with a variable index of refraction deposited thereon; and

electrodes for selectively applying an electrical potential across each grating cladding to vary the index of refraction in accordance therewith and render the grating transparent or reflective at a wavelength corresponding to a longitudinal mode of the substrate waveguide laser cavity.

32. (Previously Presented) The optical component of claim 1, further comprising:

a reflection grating in the substrate waveguide for providing feedback to the resonator cavity;

means for tuning the laser by altering the wavelength reflected by the grating, wherein the laser tuning means comprises:

electrodes and a resistive element for heating and thermally expanding the reflection grating of the substrate waveguide to alter the wavelength reflected by the grating.

33. (Previously Presented) The optical component of claim 1, further comprising:

a reflection grating in the substrate waveguide for providing feedback to the resonator cavity;

means for tuning the laser by altering the wavelength reflected by the grating, wherein the laser tuning means comprises:

electrodes for applying an electrical potential to a piezo-electric layer applied to the reflection grating to thereby vary the wavelength of light reflected by the grating.

34. (Previously Presented) The optical component of claim 1, further comprising:

a cladding composed of an electro-optic polymer with an electrically variable index of refraction deposited on the waveguide;

electrodes for applying an electrical potential across the cladding to vary the index of refraction in accordance therewith and thereby vary the effective refractive index of the waveguide cavity.

35. (Previously Presented) The method of claim 17, wherein the laser cavity has a tunable reflection grating at one end for providing optical feedback to the cavity and further comprising:

applying an external voltage to the grating in order to change the wavelength of light reflected by the grating in accordance the applied voltage, the method further comprising tuning the laser by applying an electrical potential to the grating to select a wavelength reflected by the grating that corresponds to a longitudinal mode of the substrate waveguide cavity.

36. (Previously Presented) The method of claim 35 wherein the grating is coated with a cladding composed of an electro-optic polymer having a variable index of refraction such that application of a voltage to the cladding changes the wavelength of light reflected by the grating.

37. (Previously Presented) The method of claim 35 wherein the grating is composed of an electro-optic polymer having a variable index of refraction such that application of a voltage to the cladding changes the wavelength of light reflected by the grating.

38. (Previously Presented) The method of claim 35 wherein the grating is coated with a piezo-electric coating such that application of a voltage to the coating thereby varies the wavelength of light reflected by the grating.

39. (Previously Presented) The optical component of claim 1, wherein pump light from along a majority of the length of the extended waveguide cavity is transferred along a majority of the length of the substrate waveguide.

40. (Previously Presented) The method of claim 17, wherein pump light from along a majority of the length of the extended waveguide is transferred along a majority of the length of the substrate waveguide.

41. (Previously Presented) The method of claim 17, wherein the extended waveguide forms part of a lower refractive index cladding of the substrate waveguide.

42. (Currently Amended) An apparatus comprising:

a glass substrate doped with a laser species;

a substrate waveguide defined within the glass substrate, the substrate waveguide having an output facet; and

a diode pump laser having a diode laser and a waveguide abutted to an output facet of the diode laser to provide an extended waveguide, the extended waveguide formed as a cladding on the substrate, the extended waveguide being positioned adjacent to a length of the substrate waveguide and positioned along the length of the substrate waveguide and relative to the glass substrate disposed above the substrate waveguide, the extended waveguide coupled to the substrate waveguide so that pump light from along a length of the extended waveguide is transferred into the substrate waveguide along a length of the substrate waveguide to provide light from the output facet of the substrate waveguide.

43. (Previously Presented) The apparatus of claim 42 wherein the substrate waveguide forms a laser resonator cavity within the substrate.

44. (Previously Presented) The apparatus of claim 42 wherein the laser species includes Er and Yb.

45. (Previously Presented) The apparatus of claim 42 wherein the extended waveguide forms part of a laser resonator cavity of the diode pump laser.